

REMARKS

Claims 3-6 and 8 have been objected to, but would be allowable if rewritten in independent form to include any base and intervening claims. Claims 3-6 and 8 have been rewritten in independent form to include the base and any intervening claims. As such claims 3-6 and 8 are allowable. Claims 2, 7 and 9-10, depending from claim 3, are similarly allowable. All other objections and rejections are moot in view of the above.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no. 449122064100. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,

By 

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**SUBSTITUTE SPECIFICATION
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Description



FUEL FEED UNIT

CLAIM FOR PRIORITY

This application claims the benefit of priority to German Application No. 102 46 725.0, filed October 7, 2002, the contents of which are hereby incorporated by reference.

TECHNICAL FIELD OF THE INVENTION

The invention relates to a fuel feed unit which is provided for arrangement in a fuel tank of a motor vehicle, having a fuel pump and having a pump holder which is to be fastened in the fuel tank and is intended for securing the fuel pump.

BACKGROUND OF THE INVENTION

Fuel feed units of this type are in widespread use in modern motor vehicles and are known in practice. The pump holder of the known fuel feed unit is manufactured as a plastic part by injection molding and has a plurality of resilient elements for avoiding the transmission of annoying structure-borne sound from the fuel pump to adjacent components of the fuel tank. The pump holder is generally clipped to an anti-surge pot arranged in the fuel tank.

A disadvantage of the known fuel feed unit is that the pump holder is a component which is difficult to manufacture. A cost-intensive injection molding die is also required for this purpose.

SUMMARY OF THE INVENTION

The invention is ~~based on the problem of designing~~ discloses a fuel feed unit of the type mentioned at the beginning in such a manner that it can be produced particularly cost-effectively and the transmission of structure-borne sound from the fuel pump is largely avoided.

~~This problem is solved according to the invention by the~~ In one embodiment of the invention, there is a pump holder being manufactured, at least in a central region, from metal in order to acoustically isolate the fuel pump from adjacent components.

According to another advantageous ~~development~~ embodiment of the invention, a contribution is made to further suppressing the transmission of structure-borne sound if the region which is manufactured from metal has different wall thicknesses.

According to another advantageous ~~development~~ embodiment of the invention, vibrations from the fuel pump are reliably damped by the pump holder if a resonant frequency of that region of the pump holder which is manufactured from metal lies outside the natural frequency of the fuel pump.

A contribution is made to simplifying the installation of the fuel feed unit according to the invention if the pump holder has at least one retaining ring for fastening it to an adjacent component, and has sheetmetal strips protruding in a star-shaped manner from the retaining ring. The retaining ring may be fastened, for example, to the anti-surge pot or to the fuel pump. The pump holder preferably has one retaining ring in each case on the anti-surge pot and on the fuel pump, the retaining rings being connected to each other via the sheet-metal strips.

A contribution is made to further simplifying the installation of the fuel feed unit according to the invention if the retaining ring and the sheet-metal strips are manufactured as a single piece.

According to another advantageous development of the invention, the outlay for adapting the pump holder for different fuel pumps and different fuel tanks can be kept particularly small if the retaining ring is manufactured from plastic and the sheet-metal strips are pressed into corresponding grooves of the retaining ring.

According to another advantageous ~~development~~ embodiment of the invention, the pump holder has particularly low stiffness transversely with respect to the longitudinal axis of a drive shaft of the fuel pump if that region of the pump holder which is manufactured from metal is arranged essentially parallel to the longitudinal axis of a drive shaft of the fuel pump. The fuel pump is able to move laterally, for example due to an imbalance in the drive shaft, without vibrations being transmitted to adjacent components of the fuel tank. For installation purposes, this enables the fuel pump to be fitted in a simple manner into an anti-surge pot.

BRIEF DESCRIPTION OF THE DRAWINGS

~~The invention permits numerous embodiments. To further clarify its basic principle, one of these is illustrated in the drawing and will be described below. In the drawing~~
The invention is described in more detail below with reference to the drawings, in which:

~~f~~Fig. 1 shows schematically a fuel feed unit according to the invention,

~~f~~Fig. 2 shows a longitudinal section of a sheet-metal strip of the fuel feed unit according to the invention from figure 1,

~~f~~Fig. 3 shows a view of a sheet-metal strip of the fuel feed unit according to the invention from figure 1.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 shows an anti-surge pot 2 which is prestressed against a bottom of a fuel tank 1 of a motor vehicle together with a fuel feed unit 3. The fuel feed unit 3 has a fuel pump 5 which is driven by an electric motor 4. The fuel pump 5 and the electric motor 4 are arranged in a common housing 6 and are connected to each other via a drive shaft 7. The fuel pump 5 sucks up fuel from the anti-surge pot 2 and feeds it to a connection 8 of the fuel feed unit 3, which connection can be connected to a forward-flow line (not illustrated). A cover 9 is clipped onto the anti-surge pot 2. The cover 9 is connected to a pump holder 10. The pump holder 10 has a retaining ring 11, 12, which is fastened to the cover 9 and to the housing 6 of the fuel pump 5, and has, in its central region, sheetmetal strips 13, 14 for connection of the retaining rings 11, 12. The retaining rings 11, 12 are manufactured here from plastic.

The sheet-metal strips 13, 14 extend essentially parallel to the drive shaft 7 of the fuel pump 5 and are pressed into grooves 15, 16 of the retaining rings 11, 12. Two sheet-metal strips 13, 14 are illustrated in the drawing. The pump holder 10 preferably has three sheet-metal strips 13, 14 which are arranged offset by 120° with respect to one another. As an alternative to the illustrated connection of the sheet-metal strips 13, 14 to the retaining rings 11, 12, the sheet-metal strips 13, 14 and the retaining rings 11, 12 can be manufactured as a single piece from metal. Components of this type can be manufactured in a simple manner by punching and deep-drawing. One of the sheet-

metal strips 14 has corrugations 17 and is therefore designed such that it is elastic in its longitudinal direction. The sheet-metal strips 13, 14 largely suppress the transmission of structure-borne sound from the fuel pump 5 to the anti-surge pot 2.

Figure 2 shows a further embodiment of the sheet-metal strip 18 in longitudinal section, in which different wall thicknesses have been produced, for example by stamping. Figure 3 shows a view of a further embodiment of a sheet-metal strip 19 with a constriction 20 and an enlargement 21. The sheet-metal strip 19 is manufactured as a single piece with a retaining ring 22 which is provided for fastening it to the fuel pump 5 from figure 1. The configuration of the sheet-metal strips 18, 19 according to figures 2 and 3 obstructs the transmission of structure-borne sound from the fuel pump 5 illustrated in figure 1 to the anti-surge pot 2.